

XIV.—Notes on Carides. By L. A. BORRADAILE, M.A.,
Lecturer on Zoology in the University of Cambridge;
Fellow, Dean, and Lecturer of Selwyn College.

DURING the investigation of certain collections of prawns from the Indo-Pacific region I have arrived at the following conclusions, which appear to be worth putting on record in a preliminary statement.

I. THE CRANGONOIDA.

The bounds of this superfamily must be enlarged to admit the genera *Anchistioides*, Paulson, 1875, *Amphipalæmon*, Nobili, 1901, and *Hymenocera*, Latr. This addition involves two concessions in the definition of the group: (1) if *Anchistioides* and *Amphipalæmon* are to be admitted, it can no longer be stated that the mandible is always without incisor-process; (2) the inclusion of *Hymenocera* makes it necessary to allow the persistence of a small representative of the outer lacinia of the maxilla.

Anchistioides and *Amphipalæmon* constitute a new family, the Anchistioididæ, intermediate between the Crangonoida and the Palæmonoida. The principal characteristics of this family are: (1) a well-developed, compressed, toothed rostrum; (2) a short, thick, accessory flagellum on the antennule; (3) a deeply cleft mandible without palp; (4) the absence of "lacinia" from the maxilla; (5) the absence of the exopodite from the third maxilliped; (6) an *appendix interna* on the first abdominal limb; (7) considerable variability in the armature of the telson; (8) a gill-formula consisting of pleurobranchs for the legs, an arthrobranch for the third maxilliped, and epipodites (mastigobranchs) on the maxillipeds.

Hymenocera is shown by its mouth-parts to belong to the Gnathophyllidæ. The species described by Balss as *H. ceratophthalma* deserves to become the type of a new genus. I have called this genus *Phyllognathia*, and placed it also in the Gnathophyllidæ. The principal characteristics of that family are now as follows:—(1) a compressed dentate rostrum; (2) the outer flagellum of the antennule thick at the base and cleft for a very short distance; (3) the mandible simple, slender, curved, palpless; (4) the inner "lacinia" of the maxilla lost, the outer either lost or very small but still cleft; (5) the third maxilliped with exopodite, simple mastigobranch, and endopodite of *four* joints, some or all of which

are greatly broadened; (6) the telson with two pairs of spines at the sides, and at the end an outer short and an inner longer pair of spines, a submedian pair of slender feathered spines, and a median pointed projection; (7) a gill-formula comprising pleurobranchs for the legs, an arthrobranch for the third maxilliped, and in *Hymenocera* the vestige of a pleurobranch for the latter limb, with epipodites on the maxillipeds only.

II. THE PALÆMONIDÆ.

There must be recognized in this family four subfamilies, separated as follows:—

- I. None of the bristles at the end of the larval telson become in the adult transposed on to the anterior part of that organ, which is therefore unarmed on back and sides. The surface of the molar process of the mandible is closely ridged. [There is a pleurobranch for the third maxilliped.] *Desmocaridinæ.*
- II. Two pairs of the bristles at the end of the larval telson become in the adult transposed on to the back of that organ. The surface of the molar process of the mandible bears some half-dozen large knobs or crests.
 - A. The end of the telson bears six spines. [There is no pleurobranch to the third maxilliped.] *Pontoninæ.*
 - B. The end of the telson bears four spines.
 1. The side of the carapace is traversed by a suture. The outer flagellum of the antennule is but slightly cleft. There is no pleurobranch to the third maxilliped. *Typhlocaridinæ.*
 2. The side of the carapace has no suture. The outer flagellum of the antennule is deeply cleft. There is a pleurobranch to the third maxilliped. *Palæmoninæ.*

III. DEFINITIONS OF NEW GENERA.

1. *Lysmatella* (Hippolytidæ).

Related to *Lysmata*, but without mastigobranchs on the legs.

2. *Phyllognathia* (Gnathophyllidæ).

Ischium of third maxilliped narrow and movably sutured to merus. Mandible subcylindrical. Laciniæ of maxillæ lost. Outer flagellum of antennule normal. Rostrum of a good length.

3. *Urocaridella* (Pontoniinae).

Body very slender and compressed. Thorax without dorsal swelling. Sixth abdominal segment elongate. Rostrum long, upcurved, toothed above and below. Outer flagellum of antennule deeply cleft. Antennal scale long, narrow. Mandible with two-jointed palp. Second maxilliped with podobranch. Third maxilliped narrow, five-jointed, with arthrobranch.

4. *Pontoniopsis* (Pontoniinae).

Body graceful, but not much compressed. Thorax without dorsal swelling. Sixth abdominal segment short. Rostrum rather short, depressed, lanceolate in dorsal view, toothless. Outer flagellum of antennule moderately cleft. Antennal scale of good breadth. Mandible without palp. Second maxilliped without podobranch. Third maxilliped with vestigial arthrobranch. Eyes spherical.

5. *Periclimenus* (Pontoniinae).

Body rather stout; cephalothorax deep, a good deal compressed; abdomen evenly curved. Thorax without dorsal swelling. Rostrum rather short, compressed, toothed above only. Outer antennular flagellum not deeply cleft. Antennal scale of good breadth. Mandible without palp. Second maxilliped without podobranch. Third maxilliped narrow, with vestigial arthrobranch.

IV. DEFINITIONS OF NEW SUBGENERA.

The species of *Periclimenus* fall into four groups, as follow:—

- I. Rostrum toothless. No spines on trunk and legs *Ensiger*.
- II. Rostrum toothed. Spines at certain points on trunk and legs.
 - A. Cornea ogival. [Upper edge of rostrum convex. Strong supraorbital spine.] *Corniger*.
 - B. Cornea not ogival.
 - 1. Upper edge of rostrum convex. Second leg with short wrist, and unarmed save in one species. Supraorbital spine in one species only *Cristiger*.
 - 2. Upper edge of rostrum straight or concave. Second leg rarely with short wrist, generally with spine on wrist or arm or both. Supraorbital spine common *Falciger*.

V. DEFINITIONS OF NEW SPECIES.

1. *Pandalus (Plesionica) gracilis*.

Rostrum long, gently upcurved from base, bearing above two strong teeth on a crest over the eye and eight spinules, below a row of small sharp teeth. Eye wider than stalk, with distinct ocellus. First leg simple and sparsely hairy. Second wrist 9-jointed. Third abdominal tergum not produced into spine.

Western Indian Ocean, 200 fath.

2. *Heterocarpus unicarinatus*.

Related to *H. longirostris*, MacGillchrist, 1905, but without the hinder three-quarters of the antennal carina.

Providence I., 637-665 fath.

3. *Heterocarpus affinis*.

Related to *H. alphonsi*, Bate, 1888, but has (1) the rostrum much more strongly upcurved, (2) fewer joints in the second wrists, (3) walking-legs considerably longer than the antennal scale.

Saya de Malha, 300-500 fath.

4. *Thalassocaris affinis*.

Related to *T. lucidus* (Dana), 1852, but has (1) the rostrum less strongly recurved, (2) stronger teeth on the antennal scale, (3) the second hand shaped as in *T. crinitus*.

Maldives and Saya de Malha.

5. *Thalassocaris maldivensis*.

Rostrum at first descending and then horizontal, outreaching antennal scale, $\frac{7-8}{2}$, two teeth behind orbit. Suborbital and antennal spines only. Antennal scale without teeth. Second leg feeble and simple. No spine on third abdominal tergum.

Maldiv Is.

6. *Thor maldivensis*.

Rostrum very short, with one tooth above and none below. Supraorbital and antennal spines present. First leg in female stout, simple, and shorter than third maxilliped, in male as long as body, granulate, stout, but with chela no stouter than rest of limb, arm and hand subequal, fingers one-quarter length of palm, on which they are bent inward, each

bearing a low tooth. Second wrist 5-jointed, the second joint larger than the others. Last three legs alike in both sexes.

Minikoi, Maldives, Salomon.

7. *Lysmata affinis*.

Related to *L. seticauda* (Risso), 1816, and *L. chiltoni*, Kemp, 1914, but (1) rostrum reaches beyond eyes, ends before middle of second joint of antennule, and has formula $\frac{5-6}{2-3}$, lower teeth small, but larger than in *L. chiltoni*, (2) pterygostomial angle subrectangular and usually produced into spinule, (3) first leg slightly outreaches antennal scale, but falls considerably short of end of third maxilliped.

Minikoi, Peros Banhos, Salomon, Seychelles.

8. *Lysmatella prima*.

Body compressed. Rostrum $\frac{8-11}{5-9}$, straight but upcurved at end, outreaching antennular stalk. Third maxilliped as stout as first leg, in which hand and arm are subequal, wrist a little shorter. Second wrist has 20-22 joints, the last the longest.

Maldive Is.

9. *Amphipalamon gardineri*.

Rostrum very deep, straight at base, outreaching antennal scale. Telson bears two pairs of spines on the dorsal side and at the hind end one stout pair of spines and a pair of feathered bristles.

N. Malé Atoll, Maldive Is.

10. *Amphipalamon cooperi*.

Rostrum not very deep, arched at base, reaching end of antennal scale. Telson as in *A. gardineri*, but with hinder pair of dorsal spines farther back. Meropodite of second leg $\frac{2}{3}$ of length of hand.

S. Nilandn Atoll, Maldive Is.

11. *Nikoides maldivensis*.

Related to *N. dana*, Pauls., 1875, but has (1) rostrum of quite different shape, the dorsal tooth being larger and placed much farther back, (2) exopodite of first leg relatively shorter, (3) wrists of first legs equal, (4) no spines on ischiopodite or meropodite on last three legs.

Maldive Is.

12. *Egeon rugulosum*.

Related to *A. medium* (Ale. & And.), 1899, but has (1) the beading of the ridges of the carapace much coarser, (2) no tooth on either side of base of rostrum, (3) the large spine near the pterygostomial angle placed at the end of the supra-marginal, not lateral, ridge.

Western Indian Ocean.

13. *Urocaridella gracilis*.

Rostrum $\frac{8-10}{10-12}$, nearly twice as long as carapace. Antennal and hepatic spines present. Antennular stalk three-quarters length of antennal scale. Latter not half length of rostrum, subtruncate, its distal spine not projecting. First leg outreaching antennal scale by fingers. Second legs equal and similar, unarmed, outreaching antennal scale by hand and part of wrist.

Maldive Is.

14. *Palmonella elegans*.

Related to *P. tridentata*, Borr., 1899, but with rostrum lanceolate, not reaching end of first joint of antennæ, its formula $\frac{3}{0}$.

Salomon I.

15. *Palmonella longirostris*.

Rostrum $\frac{8}{3}$, outreaching antennular stalk by nearly half its own length, upcurved. First wrist half as long again as its hand. Arm of second leg of even width throughout.

Fardifola Atoll, Maldive Is.

16. *Perichimenes (Cristiger) frater*.

Related to *P. soror*, Nobili, 1904, but (1) teeth on upper edge of rostrum closer set towards tip, (2) two distal spines on first joint of antennule, (3) antennal scale decidedly outreaches first leg, (4) no accessory denticle on dactylopodites of last three legs.

Seychelles.

17. *Perichimenes (Cristiger) incertus*.

Related to *P. parvus*, Borr., 1898, but (1) body more slender, (2) rostrum shallower, (3) a denticle on carapace behind beginning of rostral crest, (4) penultimate joint of third maxilliped longer than end-joint.

Maldive Is.

18. *Periclimenes (Cristiger) commensalis*.

Rostrum $\frac{5}{2}$, lanceolate, reaching end of antennular stalk, no tooth behind orbit. Supraorbital, hepatic, and antennal spines present. Two distal spines on first joint of antennule.

Torres Straits, on *Comanthus annulatus*.

19. *Periclimenes (Corniger) cornutus*.

Rostrum $\frac{7}{1}$, deep, lanceolate, outstretched by antennal stalk.

Eye without papilla.

Malé Atoll, Maldive Is., on erinoid.

20. *Periclimenes (Corniger) ceratophthalmus*.

Rostrum $\frac{4}{0}$, shallow, lanceolate, outreached by antennal stalk. Eye with papilla at apex.

Malé Atoll, Maldive Is., on erinoid.

21. *Periclimenes (Falciger) nilandensis*.

Rostrum $\frac{9}{4}$, outreaching antennular stalk distinctly and antennal scale barely, its upper edge gently concave from the base. Supraorbital, antennal, and hepatic spines present. Antennal scale broad, with distal spine not projecting beyond end. Second legs unequal, unarmed.

S. Nilandu Atoll, Maldive Is.

22. *Periclimenes (Falciger) affinis*.

Rostrum $\frac{7}{2}$, outreaching antennular stalk but not antennal scale, straight at first, then gently upcurved, its tip simple. Supraorbital, antennal, and hepatic spines present. Outer edge of long joint of third maxilliped bears several spines. Second leg with two spines and a blunt tooth at end of wrist, fingers toothed, about one-third length of palm, wrist nearly twice length of fingers.

Salomon I.

23. *Periclimenes (Falciger) dubius*.

Related to *P. affinis*, but (1) rostrum $\frac{8}{4}$, its tip bifid, (2) in second leg, wrist and arm stouter, and fingers about equal to wrist, more than half length of palm.

Minikoi.

24. *Periclimenes (Falciger) compressus.*

Rostrum $\frac{5}{8}$, rather shallow, straight at first but slightly upturned at end. Antennal and hepatic spines alone present. Second leg unarmed, with short wrist, outreaching antennal scale by hand.

Saya de Malha.

25. *Periclimenes (Falciger) brocketti.*

Rostrum $\frac{6}{7}$, straight, shallow, directed somewhat downwards, reaching end of antennal scale, and slightly outreaching antennular stalk. Antennal and hepatic spines alone present. Two distal spines on first joint of antennule. Second leg unarmed, with rather short wrist, slender hand, and simple fingers.

Malé Atoll, Maldive Is., on brown crinoid.

26. *Periclimenes (Falciger) pottsi.*

Rostrum $\frac{7}{2}$, reaching end of antennal scale, outreaching antennular stalk, its upper edge curving very slightly downward from the base and more strongly upwards near the tip. Hepatic and antennal spines alone present. Last two joints of antennular stalk slender. Antennal scale narrow, longer than carapace, its distal spine projecting beyond its end. Second wrist bears a spine.

Torres Straits, on *Comanthus*.

27. *Periclimenes (Falciger) suvdivensis.*

Rostrum $\frac{6-7}{2}$, outreaching antennular stalk, outreached by antennal scale, straight except at the tip, which is gently upcurved. Hepatic, antennal, and suborbital, but no supra-orbital spines present. Last two joints of antennular stalk stout. Antennal scale narrow, shorter than carapace, its distal spine projecting beyond its end. Second wrist bears a spine.

Suvadiva Atoll, Maldive Is.

28. *Periclimenes (Falciger) seychellensis.*

Rostrum $\frac{7-8}{3}$, deep, its upper edge decidedly concave from base, outreaching antennular stalk. Antennal and hepatic spines alone present. Antennal scale rather broad, its distal spine projecting beyond its end. Second legs equal, unarmed, palm and fingers subequal.

Praslin, Seychelles.

29. *Periclimenes (Fulciger) kolomadulensis*.

Related to *P. borradalei*, Rathb., 1904 (= *P. tenuipes*, Borr., 1898), but (1) rostrum $2\frac{1}{2}$ times length of carapace, (2) second leg 7 times length of carapace, (3) second legs unlike, one with fingers gaping very widely.

Kolumadulu Atoll, Maldive Is.

30. *Pontoniopsis comanthi*.

Rostrum reaching end of second joint of antennule, its breadth about equal to that of eye. Antennal scale outreaching antennular stalk, broad. Arm and wrist of first leg subequal. Great chela outreaching antennular stalk by hand, its wrist very short and wide, with a sharp process below.

Torres Straits, on *Comanthus*.

31. *Periclimenus fimbriatus*.

Rostrum $\frac{4-7}{6}$, without teeth behind orbit. Fixed finger of second leg bears knob and movable finger a socket. Fingers of uropods, scales, &c., very long.

Mulaku Atoll, Maldive Is.; Providence.

32. *Periclimenus robustus*.

Rostrum $\frac{9}{6}$, with two teeth behind orbit. Movable finger of second leg bears knob and movable finger a socket. Fringes not remarkably long.

Amirante I.

33. *Pontonia maldivensis*.

Rostrum reaches middle of first joint of antennule. Maxillipeds without exopodites. Second legs unequal, the larger about twice as long as carapace, with long, parallel-sided hand. Dactylopodites of last three legs simple.

Fadiffolu Atoll, Maldive Is.

 XV.—*New Dragonflies (Odonata) of the Subfamily Libellulinae from Sierra Leone, W. Africa.* By Dr. F. RIS, Rheinau, Switzerland.

THE following descriptions have been extracted from proof-sheets and manuscript of the writer's 'Monograph of the Libellulinae' (Collections Selys, fasc. ix.-xvi.). By the kindness of Mr. Herbert Champion I was enabled to examine